

Killer Shrimp, *Dikerogammarus villosus*



Alert Species

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Overview

Short description of *Dikerogammarus villosus*, Killer Shrimp

Adults are up to 30mm in length. The body is curled and semi-transparent. They have two pairs of antennae and large, powerful mandibles. Newly hatched young are about 1.8mm in length and resemble adults.

Description of *Dikerogammarus villosus*, Killer Shrimp status in GB

There are three known established infestations of killer shrimps in Grafham Water, Cambridgeshire, and Cardiff Bay and Eglwys Nynydd, Wales, with potential to spread rapidly if not contained.

Habitat summary: *Dikerogammarus villosus*, Killer Shrimp

While currently restricted, there are large areas of GB's canals, rivers and lakes that would provide suitable habitat for the species. They require hard banks, slow flowing water and are salt tolerant so can also colonise brackish coastal habitats.

Overview table

Environment:	Freshwater
Species status:	Non-Native
Native range:	Russian Far East, Caucasus, Russia South, Ukraine
Functional type:	Predator
Status in England:	Non-Native
Status in Wales:	Non-Native
Location of first record:	Grafham Water reservoir, Cambridgeshire
Date of first record:	2010

Invasion history: *Dikerogammarus villosus*, Killer Shrimp

Origin

Ponto-Caspian: native range is in the lower courses of large rivers in the Black and Caspian Sea basins.

First Record

Grafham Water Reservoir, Cambridgeshire, September 2010.

Pathway and Method

Spread through natural range expansion and transportation in ballast waters after the opening of the Danube-Main-Rhine canal in 1992. Surfaces such as waders, boats and angling equipment are vulnerable to fouling and could transport the species between water bodies within GB. The species could be transferred with movements of fish stocks or foraging water birds.

Species Status

The species was first found in the upper Danube in 1992 and in the lower Rhine soon after. It has successfully invaded Germany, France, Italy, Switzerland, Belgium, The Netherlands, Hungary, Austria and the Czech Republic. Killer shrimp has colonised regions such as northern France and The Netherlands that are very similar bioclimatically to much of Britain's freshwaters, making it likely that invasion of British waters will be successful if the species is introduced. The Cambridgeshire and Welsh populations are very well established.

Ecology & Habitat: *Dikerogammarus villosus*, Killer Shrimp

Dispersal Mechanisms

It is estimated that the species can spread at a mean rate of 124 km per year downstream and 30-40 km per year upstream. Dispersal is likely to be facilitated by human activities such as shipping, boating and angling; *D. villosus* fouls surfaces and is carried in ballast water. The species may also disperse downstream by drift. Transportation by birds is also possible. Recent expansion of the waterways network across Europe is likely to have facilitated spread.

Reproduction

Females may produce up to 200 eggs, however most produce less than 50 at a time. Reproduction happens when water temperature reaches 13°C. There may be three reproductive peaks per year but highest fecundity has been recorded in April and May when food is plentiful and water temperatures are rising. Individuals reach maturity between 4 and 8 weeks old, at a length of 6mm.

Known Predators/Herbivores

Trout and perch predate killer shrimps. No known invertebrate predators.

Resistant Stages

Adults can tolerate salinities of up to 20 ppt, can acclimate quickly to changes in ionic concentration and may have a wide temperature tolerance. Temperature tolerance is likely to be reduced when exposed to low ion concentrations.

Habitat Occupied in GB

Killer shrimps currently occupy reservoir habitats. They are mainly found in habitats with an artificial bank structure, high oxygen saturation and a low conductivity. They select hard structures such as stones, cobbles and tree roots and are also thought to be associated with zebra mussel beds. Many GB canals, rivers and reservoirs would therefore provide suitable habitat. Given their high salt tolerance the species could potentially penetrate brackish zones of GB rivers. The species is not typically found on sandy substratum or in areas with high current velocity.

Distribution: *Dikerogammarus villosus*, Killer Shrimp

Impacts: *Dikerogammarus villosus*, Killer Shrimp

Environmental Impact

Killer shrimp is a highly aggressive and voracious predator and is regarded as one of the most damaging invasive species in Western Europe. The species affects ecosystems through direct predation and through cascading indirect effects across trophic levels. Killer shrimp is a major predator of native shrimps, other invasive shrimps, mayflies, damselflies, leeches, chironomids, cladocera, isopods, snails, fish eggs and larvae. Sometimes macroinvertebrates are killed but not eaten, perhaps in order to remove competitors. Killer shrimps are also coprophagous, feed on detrital material and have been observed to eat zebra mussel byssus threads. It is likely that macroinvertebrate populations will decline and services such as leaf shredding and nutrient processing will be affected. However, other species may benefit from the increase in prey abundance as killer shrimp populations increase.

Health and Social Impact

Loss of diversity through ecosystem impacts could affect scoring of water quality using biological metrics and have implications for the Water Framework Directive, however supply of drinking water is unlikely to be affected.

Economic Impact

Killer shrimp is likely to affect the quality and distribution of fisheries. Observations suggest that trout and perch are feeding increasingly on Killer shrimp, which could drive changes in distribution of fish and catchability for anglers. The shrimp may also serve as an intermediate host for acanthodephalan parasites including *Echinorhynchus truttae* and *Pomphorynchus laevis* which cause disease in salmonids and reduce fishery

References & Links: *Dikerogammarus villosus*, Killer Shrimp

Identification

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Biology, ecology, spread, vectors

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